

CLAIMS

1. A disposable gas-powered needle-free injection device comprising
an outer housing having a nozzle for medicament at a forward end thereof;
an inner housing located at least partly within the outer housing;
5 a piston and ram which can be driven into the nozzle, in use, to drive medicament
through the nozzle;
a pierceable gas cylinder for providing driving power to the ram and piston;
wherein the inner housing is axially moveable away from said nozzle, said axial
movement being guided by cooperating guide means on said inner and outer housings and
10 enabling a desired dose of medicament to be drawn into said nozzle, ready for injection.
2. An injection device as claimed in claim 1 further comprising an indication of the
dose of medicament which is drawn into the device.
3. An injection device as claimed in claim 2 wherein said dose indication comprises
a visible scale.
- 15 4. An injection device as claimed in claim 2 wherein said dose indication comprises
an audible indication of the dose.
5. An injection device as claimed in any of the preceding claims wherein said guide
means comprises a substantially helical groove on said outer housing and a corresponding
protrusion on said inner housing.
- 20 6. An injection device as claimed in claim 5 wherein said protrusion comprises a
substantially helical arrangement of discrete teeth, having pits therebetween.
7. An injection device as claimed in claim 6 when dependent on claim 2 further
comprising a flexible indexer tab which can ride over said teeth in order to provide said dose
indication.
- 25 8. An injection device as claimed in claim 7 wherein at least one of said teeth has
tapered side walls to facilitate the riding over of the indexer tab.
9. An injection device as claimed in claim 7 wherein the rearmost one of said teeth
has a substantially vertical wall which acts as an endstop over which the indexer tab is prevented
from riding.

10. An injection device as claimed in claim 7 wherein said indexer tab is radially flexible and is located on a collar which substantially surrounds the outer housing.

11. An injection device as claimed in any of the preceding claims wherein said gas cylinder is pierceable by a piercing means, for example a spike, which is mounted within the inner housing.

12. An injection device as claimed in claim 11 wherein said gas cylinder is forwardly-biased by a spring.

13. An injection device as claimed in claim 11 further comprising a pad or seat intermediate the gas cylinder and the spring.

14. An injection device as claimed in claim 12 wherein the gas cylinder is prevented from moving forward as a result of said forward bias by means of a retainer sleeve.

15. An injection device as claimed in claim 14 wherein said retainer sleeve is fixed with respect to said inner housing.

16. An injection device as claimed in claim 14 or 15 wherein said retainer sleeve has a plurality of retention elements spaced around it which are able to move, by deformation of the material of the retainer sleeve, between a first position in which the retention elements engage with said gas cylinder so as to prevent forward movement thereof and a second position in which said retention elements spread radially out of engagement with said gas cylinder to allow the forwardly-biased gas cylinder to move towards said piercing means.

17. An injection device as claimed in claim 16 further comprising a lock sleeve surrounding said retention elements to prevent radial outward displacement thereof, the lock sleeve being selectively axially moveable so as to release said retention elements into said second position.

18. An injection device as claimed in claim 17 wherein said lock sleeve has apertures therein, into which said retention elements can move radially out of engagement with said gas cylinder.

19. An injection device as claimed in claim 16 wherein said retainer sleeve comprises a collet having radially-spreadable fingers, which collet in use moves between said first position in which said fingers engage with said gas cylinder and said second position in which said fingers spread radially out of engagement with said gas cylinder.

20. An injection device as claimed in claim 19 wherein said collet fingers are biased radially-inwardly.

21. An injection device as claimed in claim 17 wherein axial movement of said lock sleeve is effected by depressing a button at the rear end of the injection device.

5 22. An injection device as claimed in claim 19 wherein said gas cylinder and said collet fingers are respectively provided with cooperating tapered surfaces.

23. An injection device as claimed in any of the preceding claims wherein the ram and piston are integrally formed.

10 24. An injection device as claimed in any of the preceding claims wherein the rear of the ram is connected to the inner housing by means of frangible joints which, in use and upon piercing of the gas cylinder, break so as to release the ram from the inner housing.

25. An injection device as claimed in claim 24 wherein said frangible joints are knuckle joints suitably shaped to control the acceleration of the ram as it breaks free of the inner housing.

15 26. An injection device as claimed in claim 23 wherein said ram and piston are freely axially moveable within the nozzle and, in use when a medicament is caused to forcibly enter the nozzle, said ram and piston move axially rearward until they abut the inner housing.

27. An injection device substantially as described herein with reference to and as illustrated in any appropriate combination of the accompanying drawings.

20 28. A method of injecting a medicament using an injection device as claimed in any of the preceding claims